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## 25. ADDITIONS TO THE COCCINELLID FAUNA OF THE ANDAMAN ISLANDS AND THE BIOLOGY OF THE ENDEMIC *CHILOCORUS COELOSIMILIS* KAPUR 1966 (COLEOPTERA: COCCINELLIDAE)<sup>1</sup>

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In spite of their economic importance both as phytophages and as efficient predators of crop pests, the Coccinellidae of the Andaman Islands remain poorly known to this day. The first Coccinellid, *Epilachna nevillei* from these Islands was described as an endemic species by Dohrn in 1880 – 22 years after the British occupied these Islands, with the purpose of establishing a penal colony. In the next 51 years, only two more species were added, of which *Rodolia andamanica* Wise was also endemic. No more additions were made till Kapur (1966) based largely on specimens collected sporadically between 1959 and 1964 by members of the Zoological Survey of India, recorded 26 more species, with four endemics from these Islands in 1966. With this the total number of species known from these islands rose to 29, of which 6 are endemics (Kapur 1966). No additions have since been made to the Coccinellid fauna of the Andaman Islands. It was in this context that the current study was undertaken, to enable the further documentation of the Coccinellid diversity of these islands.

The Andaman archipelago is a chain of a little over 320 islands, situated in the Bay of Bengal between the 10° N and 14° N. Oceanic in origin (Prashanth Mohanraj and Veenakumari 1996), these Islands were inhabited solely by hunter-gatherer tribes for centuries, till the British established themselves here in 1858 following an earlier abortive attempt to do so in the last decade of the eighteenth century. It was only after the arrival of the British in the mid-nineteenth century, that these Islands began to be scrutinized for their natural historical productions.

No special techniques were employed to collect these beetles. Adults were collected from the foliage from both forests and crop fields and processed using routine

entomological procedures. The immature stages were also collected whenever noticed, brought to the laboratory and reared.

All the specimens collected/reared were sent to the Natural History Museum, London, to ascertain their identities.

### Additions to the native Coccinellid fauna

Twenty seven species of Coccinellids were collected during the course of this study. Twelve of these are being recorded for the first time from these Islands (Table 1). Only four Coccinellids have been identified to the species level,

**Table 1:** Coccinellidae (Coleoptera: Cucujoidea) recorded for the first time from the Andaman islands, India

Family	Coccinellidae
Subfamily	Stichlotidinae * <i>Jauravia pallidula</i> Motschulsky * <i>Serangium</i> sp.
Subfamily	Scymninae <i>Scymnus fuscatus</i> Boheman <i>Scymnus</i> sp. * <i>Pseudoscymnus</i> spp. 1 & 2 * <i>Cryptogonus</i> sp.nr. <i>bilineatus</i> Kapur <i>Stethorus</i> sp.
Subfamily	Coccidulinae <i>Rodolia fulvescens</i> Hoang
Subfamily	Chilocorinae <i>Chilocorus</i> sp.nr. <i>nigrita</i> (Fabricius) * <i>Platynaspis</i> sp.
Subfamily	Coccinellinae * <i>Bothrocalvia pupillata</i> (Swartz) <i>Harmonia</i> sp.

\*Taxa being recorded for the first time from the Andaman islands

**Table 2:** Duration (days) of the immature stages of *Chilocorus coelosimilis* in the Andaman islands

	Egg	Larval Instar				Prepupa	Pupa	Adult
		I	II	III	IV			
N	4	21	43	63	63	61	59	4
x	2.0	2.1	2.0	2.6	4.5	2.1	6.7	21
Range	-	2-3	2-3	2-6	3-7	2-4	5-10	20-22
S.D.	-	0.22	0.29	0.82	0.99	0.64	0.89	

while two have been found to be akin to, but distinct from, already known species. The remaining, though not identified to the species level, find a mention here because they are different from all the other species, so far, known from here. Six of the genera have never before been reported from these islands and are being recorded from here for the first time.

### Life cycle

*C. coelosimilis* takes from 20 to 22 days to complete its life cycle (Table 2). It passes through 4 larval instars and a distinct prepupal period that lasts from 2 to 4 days. Of all the stages, the pupal period is the longest, lasting 5 to 10 days. The dimensions of the egg and all larval instars are given in Table 3.

### Description of immature stages

**Egg:** The eggs are laid singly on the lower surfaces of the leaflets of the coconut palm (*Cocos nucifera*: Arecaceae) among scale insects (*Aspidiotus destructor* Signoret). They are orange-yellow in colour with a smooth, glossy surface and are cigar shaped (widest in the middle, tapering towards either end and terminally truncated). They are attached to leaf surfaces along their longitudinal axes. The larvae emerge from the eggs, by making long, lateral slits which cover about 75 per cent of the length of each egg. The chorion is double-walled with an inner translucent, papery, white layer and an outer, off-white and finely granulated layer.

### Larva

**I instar:** The head is black or deep brown in colour, with a glossy surface. It is covered sparsely with pale cream

**Table 3:** Dimensions (mm) of the immature stages of *Chilocorus coelosimilis* reared in the laboratory in the Andaman islands

	Egg	Larval Instar			
		I	II	III	IV
N	10	16	43	63	63
x	0.9	1.0	2.2	3.2	4.6
Range	0.8-1.0	0.9-1.2	1.6-3.5	2.2-4.8	3.0-5.7
S.D.	0.07	0.11	0.32	0.48	0.63

setae, which become increasingly dense on the frons. The thorax is pale cream in colour and broader than the abdomen. The dorsal shield of the prothorax is suffused with black and it has two rows of tubercles. This instar moves swiftly when active. The legs are translucent black with a distinct black annular marking between the trochanter and femur.

The abdomen is uniformly cream with dorsal, subdorsal and lateral rows of tubercles (6 tubercles per segment). These tubercles are relatively long and cream like the rest of the body for most of their lengths, but dark terminally. Each tubercle has a pale yellow or cream seta at its apex.

The cast skin is ruptured dorsally along the mid-dorsal line. It is papery and pale white in colour, with dark brown tubercular remnants. They feed on coconut scales (*Aspidiotus destructor* Signoret) by making a hole at the periphery.

**II Instar:** Head and prothorax dirty white or very pale brown with long scimitar shaped spines, which are off-white basally and then blackish along the rest of their lengths. They have long silvery setae for part of their lengths.

The meso and meta thoraxes are deep brown to black with tubercles. Dorsally there is a brownish-black band. The first three and last two abdominal segments are pale brown or off-white in colour. The fourth, fifth and sixth segments have a deep brown-black band each.

**III Instar:** The larva is white with black tubercles and black legs. The tubercles are clothed with setae, which are black basally and whitish or silvery on top. The prothorax has 5 tubercles (2 dorsal, 2 subdorsal and 1 lateral). The spiracles are located between the dorsal and subdorsal rows of tubercles in pale black insular patches. A deep longitudinal constriction passes all along the length of the body between the subdorsal and lateral rows of tubercles. The tubercles are markedly reduced in size on the last abdominal segment.

**IV Instar:** The fourth instar is not described here because we failed to collect sufficient data.

### Pupa

It forms within the last larval skin, which splits along the mid-dorsal line. The exuvia of the final instar larva splits from behind the head to the sixth abdominal segment. The old larval integument is white, with remnants of the prominent

black tubercles projecting from it; even the remnants of the legs are retained with almost no distortion. The yellow pupa appears to have thrust itself out along the mid-dorsal region. The dorsal surface of most of the thorax, a portion of the wing pads and a greater part of the dorsal surface of the abdomen are visible. This whole exposed surface is covered with very small white setae. Along the mid-dorsal abdominal segment are present depressions with a shade of black that spreads out from the depression towards the posterior margin of each segment. There is a terminally truncated tubercle at the junction of the meta thorax and the first abdominal segment, while there is another very small tubercle along the lateral margin on this abdominal segment. The entire dorsal surface is clothed with brown setae.

### Natural enemies

Multiple parasitism by the wasp *Homalotylus* sp. (Hymenoptera: Encyrtidae) was observed in *C. coelosimilis*. Four of these parasitoids emerged from one pre-pupa. This particular specimen was collected from the field as a second instar and reared individually in a glass tube. As parasitization could not have occurred in the laboratory under these rearing conditions it can be said, with a fair degree of certainty that these are larval-prepupal parasitoids, which parasitize early instars of the Coccinellid.

Kapur's (1966) is the most recent and the most comprehensive treatment of the Coccinellidae of these islands. In addition to nine species of plant feeding Epilachninae, he detailed 20 species of predaceous Coccinellinae *sensu lato* from these islands. The current survey reveals a much richer predaceous Coccinellid fauna on these Islands, including six genera hitherto not recorded from here. Of these only in two cases it was possible to identify the species. Booth (1993) is of the opinion that the *Harmonia* sp. collected from South Andaman is an undescribed species that is probably endemic to these Islands. Similarly, one of the *Scymnus* sp. collected on Rutaceae, he says, is not typical of the genus. Other genera like *Pseudoscymnus*, *Cryptogonus*, and *Chilocorus*, which are already known to be present on these Islands (*vide* Kapur 1966), are represented by additional species indicating that the Coccinellidae remain under-explored on these islands. This calls for further and more rigorous surveys and studies on this important group of predatory beetles on these Islands.

*Aspidiotus destructor* Signoret and *Neofurcaspis andamanensis* Green are the two diaspidine (Homoptera) scales that occur on coconut in these islands (Bhumannavar *et al.* 1991). The former in particular is known to be a serious pest of coconut in some parts of the world. The population of this scale builds up on these islands during summer (January to March). This population build up is, however, not high

enough to cause significant damage to the crop. Apparently a conglomerate of scale insects prevents the build up of the pest to damaging levels. Ten species of predatory Coccinellids (namely *J. pallidula*, *Scymnus* sp., two unidentified species of *Pseudoscymnus*; *Cryptogonus* sp. nr. *bilineatus*, *Chilocorus nigrita*, *C. coelosimilis*, *Pseudaspidimerus lambai*, *Telisimia* sp., and *Serangium* sp.) have so far been found to occur on coconut on these Islands. Nine of these are predators of scales. *Serangium* sp. is the only one from among these that does not feed on scales, but feeds on whiteflies instead.

In addition to these, a species of *Cybocephalus* (Coleoptera: Nitidulidae), which is a predator of scales in both its adult and larval stages, also occurs on coconut in these islands. All these predators in concert appear to be efficient in keeping the scales of coconut in check.

Other interesting taxa collected during the course of the present study are mentioned below. *B. pupillata* was collected on the leaves of *Ficus* from the Mount Harriet National Park in South Andaman. This probable aphid predator is known from southeast China and Java. It has so far not been recorded from the Indian subcontinent. *R. fulvescens*, a predator of scales, was collected from the small island of Havelock. First described in 1980 from Vietnam, this species is poorly known (Booth 1994). Similarly an unidentified species of *Scymnus*, which differs markedly from typical members of the genus, was collected on Rutaceae in S. Andaman. All these taxa require further collection and study. Focused studies are necessary on the Coccinellidae of the Andaman and Nicobar Islands. Like all oceanic islands, these Islands have a significant proportion of endemic species, which need to be collected and studied. Percentage endemism among the Coccinellids in Kapur's (1966) study was found to be 21%. The current study reveals the presence of six hitherto unrecorded genera, and an equal number of probably new species that require further study. Some or all of these six species, which remain unidentified, could turn out to be new indicating the rudimentary state of the knowledge of the Coccinellidae of these Islands. This situation has to be remedied with more rigorous and sustained studies on this important Coleopteran family on these islands.

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## 26. ADDITIONS TO LARVAL HOST PLANTS OF BUTTERFLIES OF THE WESTERN GHATS, KERALA, SOUTHERN INDIA (RHOPALOCERA, LEPIDOPTERA): PART 1<sup>1</sup>

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### Introduction

Three pioneer naturalists, E. H. Aitken, J. Davidson and T. R. Bell started the work on larval host plants of butterflies of the Western Ghats, southern India. Since their early work there has been no extensive study on the host plants of the butterflies in this region (Kunte 2000, 2006). In his report Kunte (2006) reported 26 new host plants of Western Ghats butterflies, bringing the total number of host plants of early stages of Western Ghats butterflies close to 450. In the present note, we add another dozen plants to this growing list of host plants of butterflies of the Western Ghats. This also includes new families of host plants for a few butterflies, e.g. Zingiberaceae for *Gangara thyraxis*. Our records have been checked against the records of Bell (1910-1927), Wynter-Blyth (1957), Kunte (2000, 2006) and the most recent exhaustive compilation of larval host plants of Oriental Lepidoptera by Robinson *et al.* (2001). The list of floras from which plant identities and current scientific names have been confirmed is given below in references.

Our observations are from southern Western Ghats, in the districts of Thiruvananthapuram and Kollam, from the state of Kerala (approx. 8° 18'-9° 55' N and 76° 18'-77° 25' E). Some supporting observations are from neighbouring districts of Pathanamthitta, Kottayam and Alapuzha. Specific localities from where the caterpillars were collected were: 1) Thiruvananthapuram city suburbs, especially around Aakulam lake, 2) Government Medical College campus, Thiruvananthapuram, 3) Ponnudi-Kallar valley region (8° 45' N; 77° 6' E), Thiruvananthapuram district, 4) Chengannur in Alappuzha district, and 5) Thenmala region (8° 50' N; 77° 15' E), Kollam district. All observations were made between 2000 and 2005.

### Methods

Caterpillars collected were reared in plastic containers suitable for their size, e.g. for a 3 cm long caterpillar we used a 9 cm x 6 cm x 6 cm sized cage. Holes of size 1 mm x 1 mm per sq. cm were provided for sufficient aeration and maintenance of appropriate humidity. Food plants were changed, the cage was cleaned and fresh leaves were put every day. We included records only when butterflies were successfully reared from larvae, thus it excludes oviposition mistakes by these species.

### Family Nymphalidae

#### 1. *Melanitis leda* Linnaeus Common Evening Brown

*Rottboellia cochinchinensis* (Lour) W. Clayton, Poaceae, a tall gregarious herb in open spaces and roadsides, suburbs of Thiruvananthapuram, July and December 2004.

*Brachiaria mutica* Stapf, Poaceae, a gregarious tall grass at edges of water and in marshes, at Aakulam, Thiruvananthapuram city suburbs, January-March 2005.

#### 2. *Ypthima hnebneri* Kirby Common Fourring

*Axonopus compressus* (Swartz) Beauv., Poaceae, a small to medium sized herb at Aakulam, Thiruvananthapuram city suburbs, January-February 2005.

#### 3. *Orsotrioena medus* Fabricius The Nigger

*Brachiaria mutica* Stapf, Poaceae, a gregarious tall grass at edges of water and in marshes at Aakulam, Thiruvananthapuram city suburbs, January-February 2005.